इंटरनेट मानक

Disclosure to Promote the Right To Information

Whereas the Parliament of India has set out to provide a practical regime of right to information for citizens to secure access to information under the control of public authorities, in order to promote transparency and accountability in the working of every public authority, and whereas the attached publication of the Bureau of Indian Standards is of particular interest to the public, particularly disadvantaged communities and those engaged in the pursuit of education and knowledge, the attached public safety standard is made available to promote the timely dissemination of this information in an accurate manner to the public.

“जानने का अधिकार, जीने का अधिकार”
Mazdoor Kisan Shakti Sangathan
“The Right to Information, The Right to Live”

“पुराने को छोड नये के तरफ”
Jawaharlal Nehru
“Step Out From the Old to the New”

IS 10126 (1986): Sparklers [CHD 26: Explosives and Pyrotechnics]

“ज्ञान से एक नये भारत का निर्माण”
Satyanarayan Gangaram Pitroda
“Invent a New India Using Knowledge”

Act Number 22 of 2005
The Indian Parliament
RIGHT TO INFORMATION

Made Available By
Public.Resource.Org

“ज्ञान एक ऐसा खजाना है जो कभी चुराया नहीं जा सकता है”
Bhartṛhari—Nītiśatakam
“Knowledge is such a treasure which cannot be stolen”

BLANK PAGE

BRUTUM FULMEN

IGNORANTIA JURIS NON EXCUSAT

PROTECTED BY COPYRIGHT

Indian Standard
SPECIFICATION FOR SPARKLERS
(First Revision)

First Reprint SEPTEMBER 1994

UDC 662.113.38

© *Copyright* 1987

BUREAU OF INDIAN STANDARDS
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
NEW DELHI 110002

Gr 3 *February* 1987

Indian Standard

SPECIFICATION FOR SPARKLERS

(First Revision)

Explosives and Pyrotechnics Sectional Committee, CDC 51

Chairman	*Representing*
Dr H. Mukherjee	Chief Controller of Explosives, Nagpur
Members	
Shri A. S. Ghosal (*Alternate* to Dr H. Mukherjee)	
Shri Avtar Singh	National Fertilizers Ltd, New Delhi
Shri P. K. Banerjee	National Mineral Development Corporation Ltd, Hyderabad
Shri S. O. Garg (*Alternate*)	
Shri V. M. Bhandarkar	Directorate General of Ordnance Factories, Calcutta
Shri M. L. Dutta (*Alternate*)	
Shri M. M. Bhattacharya	Central Mining Research Station, Dhanbad
Shri C. N. Chandrasekharan	Tamilnadu Industrial Explosives Ltd, Vellore
Shri R. Govindarajan (*Alternate*)	
Director (Mines Safety Equipment)	Directorate General of Mines Safety, Dhanbad
Joint Director of Mines Safety (*Alternate*)	
Shri A. Grahadurai	National Fireworks Factory, Sivakasi
Shri S. Ramesh Babu (*Alternate*)	
Shri N. K. Jain	Narendra Explosives Ltd, Dehra Dun
Shri J. W. Kawathekar (*Alternate*)	
Shri V. N. S. Mathur	Ordnance Factory, Bhandara
Shri B. M. Lal (*Alternate*)	
Shri B. Minj	Directorate General of Technical Development, New Delhi
Shri A. A. Niazi	IBP Company Limited, New Delhi
Dr P. R. Nambiar (*Alternate*)	
Shri K. U. B. Rao	Ministry of Defence (R & D)
Dr S. B. Ray	Ministry of Defence (DGI)
Shri D. P. Basu (*Alternate*)	
Shri P. R. Roy	Central Mine Planning & Design Institute Limited, Ranchi
Shri S. S. Salodkar	Coal India Limited, Calcutta
Shri S. N. Nandy (*Alternate*)	

(*Continued on page* 2)

© *Copyright* 1987
BUREAU OF INDIAN STANDARDS
This publication is protected under the *Indian Copyright Act* (XIV of 1957) and reproduction in whole or in part by any means except with written permission of the publisher shall be deemed to be an infringement of copyright under the said Act.

(*Continued from page* 1)

Members	*Representing*
Shri P. Satyanarayana	Development Commissioner, Small Scale Industries, New Delhi
Dr S. K. Kapoor (*Alternate*)	
Shri H. N. Srihari	IEL Limited, Calcutta
Shri S. Seshan (*Alternate*)	
Shri K Viswanathan	Noble Explochem Limited, Nagpur
Shri M. R. Bodhamage (*Alternate*)	
Dr S. R. Yoganarasimhan	IDL Chemicals Limited, Hyderabad
Dr G. D. Prasad (*Alternate*)	
Shri Satish Chander, Director (Chem)	Director General, ISI (*Ex-officio Member*)

Secretary

Dr R. K. Bajaj
Assistant Director (Chem), ISI

Pyrotechnics Subcommittee, CDC 51:6

Convener	
Shri A. Grahadurai	National Fireworks Factory, Sivakasi
Members	
Shri S. Ramesh Babu (*Alternate* to Shri A. Grahadurai)	
Dr N. S. Bankar	Explosive Research & Development Laboratory Pune
Shri S. P. Sontaka (*Alternate*)	
Shri A. Chelladhurai	Standard Fireworks, Sivakasi
Shri C. Subhasingh (*Alternate*)	
Dr S. K. Kapoor	State Trading Corporation of India, Madras
Shri V. N. S. Mathur	Directorate General of Ordnance Factories, Calcutt
Shri R. P. Ahuja (*Alternate*)	
Shri Harish Shamlal Milwani	Shama Fireworks Industries, Jalgaon
Shri Prakash Shamlal Milwani (*Alternate*)	
Dr H. Mukherjee	Chief Controller of Explosives, Nagpur
Shri A. S. Ghoshal (*Alternate*)	
Shri P. Satyanarayana	Development Commissioner, Small Scale Industrie New Delhi
Shri P. Shenba Gamoorthy	Tamilnadu Fireworks and Amorces Mfrs' Associatio Sivakasi
Shri S. K. D. Rathinam (*Alternate*)	

Indian Standard

SPECIFICATION FOR SPARKLERS

(First Revision)

0. FOREWORD

0.1 This Indian Standard (First Revision) was adopted by the Indian Standards Institution on 15 September 1986, after the draft finalized by the Explosives and Pyrotechnics Sectional Committee had been approved by the Chemical Division Council.

0.2 This standard was first published in 1982. The original standard covered five grades of sparklers based on the nominal length of the chemical mixture In this revision, a new grade of sparkler having 5 cm nominal coated length has been introduced. A new requirement regarding the total length of sparklers and tolerance limits for total length and nominal coated length have been introduced. The silver nitrate method for test of chlorate has also been replaced by aniline hydrochloride method.

0.3 The sparklers are one of the pyrotechnic materials used for entertainment purpose on special occasions and festivals. They are popularly known as **'PHULJARI'**. They are safe in use and operate by the principle of controlled combustion of non-explosive chemical mixture. The production of sparklers in this country is confined to small scale sector and is predominantly concentrated in Sivakasi region of South India.

0.4 For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test or analysis, shall be rounded off in accordance with IS : 2-1960*. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

1. SCOPE

1.1 This standard prescribes the requirements and the methods of sampling and test for sparklers.

---

*Rules for rounding off numerical values (*revised*)

2. TERMINOLOGY

2.0 For the purpose of this standard, the following definition shall apply.

2.1 Sparkler — A sparkler consists of a stick or wire partly coated with a mixture of pyrotechnic material, as approved by statutory authority, in such a way that when ignited it burns with bright sparks but does not allow the hot residue to be detached either during or after combustion

3. TYPES

3.1 The sparklers shall be of the following types·

a) Gold Sparklers — which produce golden colour sparks only;

b) Electric Sparklers — which produce crackling sound along with golden and silvery sparks; and

c) Coloured Sparklers — which produce red or green glow and silvery sparks.

4. GRADES

4.1 The sparklers shall be of six grades according to the nominal length of their chemical mixture (*see* **5.2**).

5. REQUIREMENTS

5.1 Description — The sparklers shall burn continuously with the emission of continuous sparks It shall not produce any appreciable flame. No hot ash shall fall out of burning sparkler or burnt sparkler

5.1.1 The coated length of the sparkler shall not at any time have any cracks

5.1.2 The length of wire shall be such that it will not cause any undue heat at the free end and it shall not be bent more than half of its length while burning or after being burnt

5.1.3 The sparks falling down from a burning sparkler shall not ignite or cause burning marks when held over a newspaper at a height of 45 cm.

AMENDMENT NO. 1 MAY 1993
TO
IS 10126 : 1986 SPECIFICATION FOR SPARKLERS

(First Revision)

(*Page* 4, *clauses* 4 and 4.1)— Substitute 'sizes' *for* 'grades'.

(*Page* 4, *clause* 5.1) — Substitute the following for the existing clause:

'5.1 **Description** — The sparkler shall burn continuously to its full length with the emission of sparks. It shall not produce any appreciable flame. No hot ash shall fall out of burning sparkler or burnt sparkler.'

(*Page* 4, *clause* 5.1.3) —Substitute the following for the existing clause:

'5.1.3 The sparks falling down from a burning gold or coloured sparkler shall not ignite or cause burning marks when held over a newspaper at a height of 45 cm. For electric sparklers the height shall be 60 cm.'

(*Page* 4, *clause* 5.1.3) — Insert the following new clause after 5.1.3:

'5.1.4 The gold sparklers shall produce sparks predominantly of golden colour. The electric sparklers shall produce crackling sound alongwith golden and silver sparks. The coloured sparklers shall produce sparks of other colours such as red or green glow, etc.'

(*Page* 5, *clause* 5.2) — Substitute the following for the existing clause:

'5.2 **Length, Mass and Diameter** — The total length, nominal coated length, mass of the pyrotechnic material and diameter of wire of the sparkler shall be as follows:

Size	*Total Length* cm	*Coated Length* cm	*Length of Free End, Min* cm	*Mass of Coating, Min* g	*Diameter of Wire, Min* mm
1	10+0.4 -0.0	5± 0.4	5	1.5	1.00
2	14 +0.4 -0.0	7± 0.4	7	3	1.00
3	16+ 0.5 -0.0	9± 0.5	7	4	1.00

Size	*Total Length* cm	*Coated Length* cm	*Length of Free End, Min* cm	*Mass of Coating, Min* g	*Diameter of Wire, Min,* mm
4	21 +0.8 -0.0	12± 0.8	9	5	1.25
5	27 +1.0 -0.0	15± 1.0	12	8	1.60
6	45+1.5 -0.0	30± 1.5	15	20	1.60

NOTE— The mass of coating shall not exceed 22 g.'

(*Page* 5, *clause* 5.8) — Insert the following new clause after 5.8:

'**5.9 Chemical Composition** — The chemical composition of the pyrotechnic charge shall be as approved by the Chief Controller of explosives.'

(*Page* 5, *clause* 6.1) — Substitute the following for the existing clause :

'**6.1 Packing** — The sparkler shall be packed in suitable cardboard boxes. The sparkler of 5,7,9,12, and 15 cm coated length shall be packed in boxes of ten and the sparkler of 30 cm coated length shall be packed in the boxes of five. Ten such boxes shall be packed in packets.'

(CHD 026)

5.2 Length, Mass and Diameter — The total length, nominal coated length, mass of the pyrotechnic material and diameter of wire of the sparkler shall be as follows:

Grade	*Total Length* (cm)	*Coated Length* (cm)	*Length of Free End Min* (cm)	*Mass of Coating* (g)	*Diameter of Wire* (mm)
1	$10^{+0\cdot4}_{-0\cdot0}$	5 ± 0·4	5	1·5 ± 0·2	1·00
2	$14^{+0\cdot4}_{-0\cdot0}$	7 ± 0·4	7	3 ± 0·3	1·00
3	$16^{+0\cdot5}_{-0\cdot0}$	9 ± 0·5	7	4 ± 0·4	1·00
4	$21^{+0\cdot8}_{-0\cdot0}$	12 ± 0·8	9	5 ± 0·5	1·25
5	$27^{+1\cdot0}_{-0\cdot0}$	15 ± 1·0	12	8 ± 0·5	1·60
6	$45^{+1\cdot5}_{-0\cdot0}$	30 ± 1·5	15	20 ± 2	1·60

5.2.1 The mass of coating of sparklers shall be determined by removing it from the wire mechanically and weighing it in a tared dish or a glazed paper.

5.3 Burning Rate — When tested as prescribed in Appendix A, the burning rate shall be 0·25 to 0·35 cm/sec.

5.4 Residue on Burning — When tested as prescribed in Appendix B, the residue shall be 70 ± 10 percent by mass.

5.5 Chlorate Content — The material shall be found containing no chlorate when tested by the method prescribed in Appendix C.

5.6 Damp Proofness — The material shall pass the test prescribed in Appendix D.

5.7 Wire — The wire meant for sparklers shall consist of copper/brass/zinc coated steel/zinc coated iron wire.

5.8 Stability — The sparklers shall pass the stability test at 75°C for 48 hours as prescribed in Appendix E.

6. PACKING AND MARKING

6.1 Packing — The sparklers shall be packed in suitable cardboard boxes. The sparklers of 10, 14, 16, 21 and 27 cm total length shall be packed in boxes of ten and the sparklers of 45 cm total length shall be packed in boxes of five. Ten such boxes shall be packed in packets.

6.2 Marking — Each box shall be legibly and indelibly marked with the following information:

a) Name, type and grade of material;

b) Name of the manufacturer and/or his recognized trade-mark, if any; and

c) Batch number in code or otherwise to enable the lot of manufacture to be traced from records.

6.2.1 In addition to the above, the following cautionary note shall also appear on the label:

Hold in hand with arm extended away from body. Keep away from cloth and other flammable material. Do not touch glowing wire. Use outdoors only, wearing shoes, under adult supervision.

6.2.2 The boxes may also be marked with the Standard Mark.

6.2.3 The use of the Standard Mark is governed by the provisions of Bureau of Indian Standards Act, 1986 and the Rules and Regulations made thereunder. The details of conditions under which the licence for the use of Standard Mark may be granted to manufacturers or producers may be obtained from the Bureau of Indian Standards.

7. TEST METHODS

7.1 Tests for the requirements laid down in **5.3** to **5.6** and **5.8** shall be carried out as prescribed in Appendices A to E.

7.2 Quality of Reagents — Unless specified otherwise, pure chemicals and distilled water (*see* IS : 1070-1977*) shall be employed in tests.

NOTE — 'Pure chemicals' shall mean chemicals that do not contain impurities which affect the results of analysis.

8. SAMPLING

8.1 Representative samples of the material shall be drawn and conformity of the material to requirements of the specification shall be determined according to the procedure prescribed in Appendix F.

---

*Specification for water for general laboratory use (*second revision*).

APPENDIX A

(*Clauses* 5.3 *and* 7.1)

DETERMINATION OF BURNING RATE

A-1. PROCEDURE

A-1.1 Measure the length of the chemical layer in the sparkler. Initiate the sparkler and start the stop watch simultaneously. Note down the time at which the sparkler stops burning. Carry out the test with six sparklers and take the mean value.

A-1.2 Calculation

$$\text{Burning rate, cm/sec} = \frac{a}{b}$$

where

a = length in cm of chemical layer in the sparkler, and
b = time in sec taken by the sparkler to burn.

APPENDIX B

(*Clauses* 5.4 *and* 7.1)

DETERMINATION OF RESIDUE ON BURNING

B-1. PROCEDURE

B-1.1 Find the mass of a sparkler. Initiate the sparkler and allow to burn in a drought of free air. Allow the residue to cool in air. Find out the mass of wire with residue. Scrap out the residue from the wire and take the mass of wire alone.

B-1.2 Calculation

$$\text{Ash content, percent by mass} = \frac{b - c}{a - c} \times 100$$

where

b = mass in g of the wire and residue after ignition,
c = mass in g of the wire alone, and
a = mass in g of the sparkler.

APPENDIX C

(*Clauses* 5.5 *and* 7.1)

TEST FOR CHLORATE

C-1. REAGENT

C-1.1 Aniline Hydrochloride — Dissolve 18 g of redistilled aniline in 375 ml of concentrated hydrochloric acid and make up the volume to 500 ml with water. Add 2 drops of saturated potassium chlorate solution, shake and allow to stand overnight. Filter off the blue sediment, store the reagent in a glass stoppered bottle in the dark.

C-2. PROCEDURE

C-2.1 Dissolve 5 g of the chemical composition of sparkler in 40 ml of water, filter if necessary, and make up to 100 ml with aniline hydrochloride reagent.

C-2.2 The material shall be considered to have passed the test if no blue colouration is developed in 10 minutes.

APPENDIX D

(*Clauses* 5.6 *and* 7.1)

TEST FOR DAMP PROOFNESS

D-1. PROCEDURE

D-1.1 Take six pieces of sparklers and expose to an atmosphere of 90 percent relative humidity at 27 ± 1°C (*see* **D-1.1.1**) for 24 hours. Examine the sparklers after this period. The material shall be considered to have passed the requirement of the test if on ignition:

a) The sparklers burn continuously with the emission of continuous sparks; and

b) No hot ash falls out of burning sparklers or burnt sparklers.

D-1.1.1 The test atmosphere of 90 percent relative humidity at 27 ± 1°C may be obtained as follows:

Place in a desiccator an aqueous sludge of hydrated zinc sulphate so that the area of the surface of the sludge is not less than 75 percent of the floor of the desiccator. The inner plate shall have sufficient perforations so as to diffuse water vapours freely within the desiccator.

APPENDIX E

(*Clauses* 5.8 *and* 7.1)

TEST FOR STABILITY

E-1. GENERAL

E-1.1 The test is carried out by placing the sparklers in an oven maintained at 75°C and examining for ignition.

E-2. APPARATUS

E-2.1 Air Oven — fitted with a thermometer graduated up to 100°C.

E-3. PROCEDURE

E-3.1 Take six pieces of sparklers and place them on watch glasses in the oven. Close the door of the oven and raise its temperature to 75°C and maintain for 48 hours.

E-3.1.1 The samples shall be taken to have passed the test if the sparklers do not ignite during the test.

APPENDIX F

(*Clause* 8 1)

SAMPLING OF SPARKLERS

F-1. SCALE OF SAMPLING

F-1.1 Lot — All the boxes of sparklers of one type and one grade and belonging to the same batch of manufacture shall constitute a lot

F-1.2 For ascertaining the conformity of the material to the requirements of the specification, samples shall be tested from each lot separately.

F-1.3 The number of boxes to be selected from a lot shall depend on the size of the lot and shall be according to Table 1.

F-1.3.1 The packets from the lot and boxes from the packets shall be selected at random. In order to ensure the randomness of selection, procedures given in IS : 4905-1968* may be followed.

---

*Methods for random sampling.

TABLE 1 SCALE OF SAMPLING

(*Clause* F-1.3)

No. of Boxes in the Lot	No. of Packets to be Selected	No. of Boxes to be Selected	No. of Boxes to be Selected for Damp Proofness	For Requirements Given in 5.1, 5.2 and 5.7			No. of Tests for Each of the Requirements Given in 5.3, 5.4, 5.5 and 5.8
				No. of Boxes to be Selected	No. of Sparklers to be Selected	Permissible No. of Defectives	
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Up to 500	2	6	2	4	13	1	1
501 to 1 000	3	9	3	6	20	2	2
1 001 to 3 000	5	12	4	8	32	3	3
3 001 to 10 000	7	15	5	10	50	5	4
10 001 and above	10	21	6	15	80	7	5

F-2. NUMBER OF TESTS AND CRITERIA FOR CONFORMITY

F-2.1 From the number of boxes selected according to col 3 of Table 1, the number of boxes given in col 4 of Table 1 shall be randomly chosen. From these boxes six pieces of sparklers shall be randomly selected so that each box is represented and subjected to the test for damp proofness given in **5.6**.

F-2.1.1 The lot shall be considered to have satisfied the requirements of damp proofness if all the sparklers in the sample satisfy the corresponding requirement.

F-2.2 The lot having been found satisfactory according to **F-2.1** shall be further tested for requirements given in **5.1**, **5.2** and **5.7** of the specification. For this purpose, the number of boxes given in col 5 of Table 1 shall be used. These shall be the boxes remaining out of the boxes selected according to col 3 of Table 1 (after taking the number of boxes required for damp proofness according to **F-2.1**). From each of the boxes so selected, approximately equal number of sparklers shall be selected so as to constitute the requisite sample size given in col 6 of Table 1. Any sparkler failing to satisfy one or more of these requirements shall be considered as defective.

F-2.2.1 The lot shall be considered to have satisfied these requirements if the number of defectives found in sample is less than or equal to the corresponding permissible number of defectives given in col 7 of Table 1.

F-2.3 The lot having satisfied the requirements given in **F-2.1** and **F-2.2** shall be finally tested for the remaining requirements given in **5.3**, **5.4**, **5.5** and **5.8** For this purpose, the number of tests to be conducted for each of these requirements is given in col 8 of Table 1. The required number of sparklers for carrying out these tests shall be selected from those boxes already tested according to **F-2.2** and found satisfactory.

F-2.3.1 The lot shall be considered to have satisfied these requirements if no failure occurs.

BUREAU OF INDIAN STANDARDS

Headquarters:

Manak Bhavan, 9 Bahadur Shah Zafar Marg, NEW DELHI 110002

Telephones: 331 01 31, 331 13 75

Telegrams: Manaksanstha
(Common to all Offices)

Regional Offices:		*Telephone*
Central	Manak Bhavan, 9 Bahadur Shah Zafar Marg, NEW DELHI 110002	331 01 31 331 13 75
*Eastern	: 1/14 C. I. T. Scheme VII M, V. I. P. Road, Maniktola, CALCUTTA 700054	36 24 99
Northern	: SCO 445-446, Sector 35-C, CHANDIGARH 160036	2 18 43 3 16 41
Southern	: C I T Campus, MADRAS 600113	41 24 42 41 25 19 41 29 16
†Western	: Manakalaya, E9 MIDC, Marol, Andheri (East), BOMBAY 400093	6 32 92 95

Branch Offices:	
'Pushpak', Nurmohamed Shaikh Marg, Khanpur, AHMADABAD 380001	2 63 48 2 63 49
‡Peenya Industrial Area 1st Stage, Bangalore Tumkur Road BANGALORE 560058	38 49 55 38 49 56
Gangotri Complex, 5th Floor, Bhadbhada Road, T. T. Nagar, BHOPAL 462003	6 67 16
Plot No 82 83, Lewis Road, BHUBANESHWAR 751002	5 36 27
53/5 Ward No 29, R G Barua Road, 5th Byelane, GUWAHATI 781003	3 31 77
5-8-56C L N Gupta Marg (Nampally Station Road), HYDERABAD 500001	23 10 83
R14 Yudhister Marg C Scheme, JAIPUR 302005	6 34 71 6 98 32
117/418 B Sarvodaya Nagar, KANPUR 208005	21 68 76 21 82 92
Patliputra Industrial Estate, PATNA 800013	6 23 05
T C No. 14/1421, University P.O., Palayam TRIVANDRUM 695035	6 21 04 6 21 17

Inspection Offices (With Sale Point):	
Pushpanjali, First Floor, 205-A West High Court Road, Shankar Nagar Square, NAGPUR 440010	2 51 71
Institution of Engineers (India) Building, 1332 Shivaji Nagar, PUNE 411005	5 24 35

---

*Sales Office in Calcutta is at 5 Chowringhee Approach, P O Princep Street Calcutta 700072 27 68 00

†Sales Office in Bombay is at Novelty Chambers, Grant Road, Bombay 400007 89 65 28

‡Sales Office in Bangalore is at Unity Building, Narasimharaja Square, Bangalore 560002 22 36 71

Reprography Unit, BIS, New Delhi, India